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The Patent Office
Concept House
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22 MAR 2005

PRIORITY DOCUMENT

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Signed Andrew Gersey

Dated 13 January 2004

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10 OCT 2002
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110CT02 E754839 C04074
P01/7700 0.00-0223567.9

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

10 OCT 2002

The Patent Office
Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

BLADE

2. Patent application number
(The Patent Office will fill in this part)

0223567.9

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

WILLIAM ANTHONY DENNE
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GREAT SHELFORD
CAMBRIDGE CB2 5EL

Patents ADP number *(if you know it)*

3284502001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

CERAMIC RAZOR BLADE

5. Name of your agent *(if you have one)*

AS IN 3 ABOVE

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
UK	0222712.2	01/OCT/02

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*
N/A	

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

NO

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	0
Description	2 / CF
Claim(s)	0
Abstract	1 /
Drawing(s)	0

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	N/A
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature W. A Dennis Date 10 OCTOBER

12. Name and daytime telephone number of person to contact in the United Kingdom 01223 846191

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

d) *If you have answered 'Yes' Patents Form 7/77 will need to be filed.*

e) *Once you have filled in the form you must remember to sign and date it.*

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CERAMIC RAZOR BLADES

Razor blades have traditionally been made from high quality carbon steel. The innovation of using stainless steel has been fraught with the difficulty of forming and holding an ultra sharp edge. Stabilised or partially stabilised zirconia blades are now well known. The material is as tough and strong as tool steel but has much greater hardness. Ground ceramic razor blades tend to have a ragged microstructure rather than rounded and so dig into skin rather than sliding over it.

According to the present invention, there are razor blades that are fabricated from a ceramic ink that is screen printed on a combustible surface then fired. The ceramic is preferably stabilised or partially stabilised zirconia. The combustible surface is preferably a plastic film of high surface finish. The ink vehicle and combustible surface may be so chosen that the ink wets the combustible surface.

Stabilised zirconia forms exceptional cutting blades. It is extremely strong, tough and hard. In thin sheets it may be very pliable. It would appear to be an excellent medium for razor blade fabrication. The raw material is very expensive compared with steel and is expensive to diamond machine. Cutting edges in zirconia are conventional created by diamond machining, but this process produces ragged edges on a micro-scale which tend to dig into skin rather than slide over it. This, of course, is disastrous in a razor blade.

Screen printing of ceramic inks is a well known mass production technique in hybrid electronics. This produces a thin film of very finely controlled thickness at very low cost. The ink comprises very finely powdered ceramic in a binder and solvent. It is possible to choose the composition of ink such that it wets the substrate and the edges

of the print flow slightly to form a sharply pointed meniscus. On firing, the substrate may burn away and the meniscus will form a very sharp edge. The firing process causes the finely powdered grains to sinter into a solid mass. This process may be exploited to form an edge to the blade which is rounded on a microscale. With modern milling techniques, the powder particle size may be some tens of nanometres. It is possible therefore to organise the firing to produce a blade with an edge radius of possible 50 nanometres or less.

The ceramic will take the surface finish of the substrate on the printed side, which may approach optical quality for many plastic films. If this is the side that faces the skin, a very smooth blade will result. Screen printing produces very thin layers with excellent reproducibility. Zirconia blades as thin as 0.025 mm are likely to be feasible. By using thin blades of minimum width, blade costs of a fraction of a penny should be feasible.

This fabrication technique offers the possibility of large scale mass coupled with low materials cost and no finishing processes.

CERAMIC RAZOR BLADES

Abstract

Stabilised or partially stabilised zirconia may be screen printed onto a wettable plastic film then fired to produce low cost razor blades with an excellent edge.